SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CCXII.] SEPTEMBER, 1883. [PRICE FOURPENCE, or 5s. per ann post free.

HOW TO KEEP THE CLOCK RIGHT.

To the Editor of the Meteorological Magazine.

SIR,—I see that in the June issue of your *Meteorological Magazine* you speak of the difficulty that there is in getting a cheap and good clock; one that will keep time to a minute a month, you indicate as being sufficient. You suggest that £5 should purchase such a clock, and that very superior work in the train is not required. This latter is an error, as to keep accurate time, not only must the pendulum be accurately compensated, but the work done by the pendulum and the impulse received by it must be constant and equal on both sides.

I have designed an electric clock in which the above requirements are satisfied, as the electricity merely raises and drops a gravity arm on each side of the pendulum alternately, and a clock made by me, with a pendulum consisting of a pine rod and a zinc cylinder, 18 pounds in weight and about 13½ inches long by 2½ in diameter, keeps time to a few seconds a week. I have given all the particulars to G. Cook, 19, Arundel Square, Barnsbury, N., who tells me that he can supply the above from £8.

I remain, yours truly,

H. B. T. STRANGWAYS.

5, Pump Court, Temple, E.C., July 31st, 1883.

[We are delighted with the above letter, because it seems to us (subject of course to correction by those who, like Mr. Strangways, are authorities on the subject) that the letter proves that our requirements can be met at the price which we named.

We suggested that for meteorological purposes, for the registration of the time of earthquake shocks, of auroral phenomena, &c., a clock would suffice which kept time within a minute a month, *i.e.*, 15 seconds per week. Mr. Strangway's clock, with its electrical adjustment, is still more accurate, for probably "a few seconds" implies from five to ten, and it costs only £3 more than we desire.

But we want a £5 clock which can be recommended to our observers, and notwithstanding Mr. Strangway's remarks as to our being in error in stating that "very superior work in the train is not

required," we at present adhere to that view, and we do so in consequence of the experience we are about to record.

About ten years since we purchased, at a farm-house sale in Leicestershire, an old-fashioned 8-day striking clock, 7 feet high, and in an oak case, for £3 10s. Including packing, &c., it cost about £4 delivered in London. It was a very ordinary clock, with of course an iron rod for the pendulum, and no arrangement for giving maintaining power while winding, so that at each weekly winding it lost about three quarters of a minute. A well varnished rod of mahogany was substituted for the iron pendulum rod, and a small weighted lever was so fixed as to give (by pulling a string) maintaining power during winding, and the clock was screwed very firmly to a stout wall. The cost of these alterations was 10s 6d. It has been checked more or less regularly by transit observations ever since, but the record for the first few months of this year will probably be sufficient. It may be well to explain that the following values are not in all cases true to a single second, because the record is not kept in figures, but as a diagram.

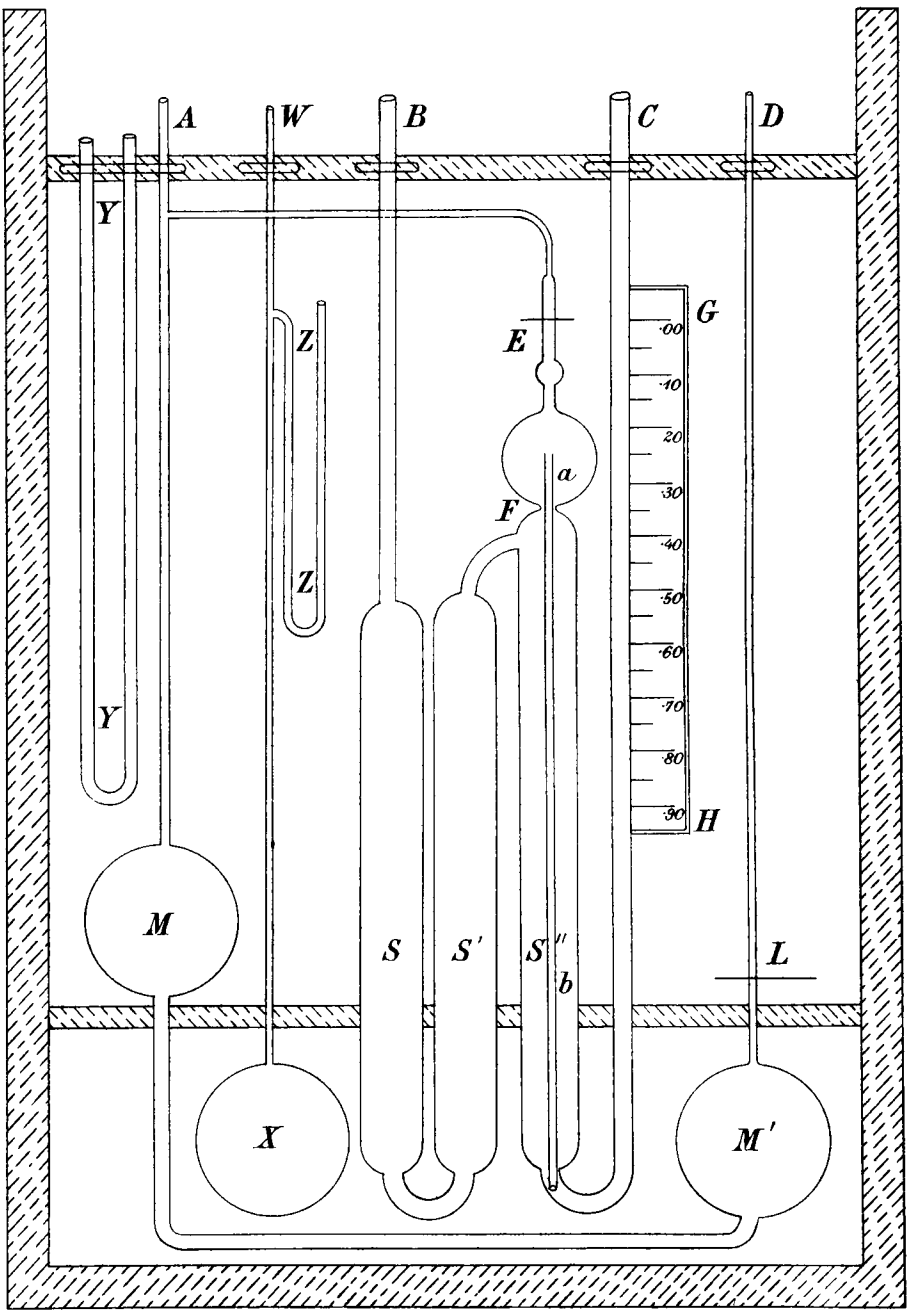
The subject is not of sufficient importance for it to be worth while for us to make systematic transit observations, and, therefore, our practice is to take them occasionally, and to mark them on a diagram, joining all the dots, and so making a continuous curve. The following values are read off from this curve. In the period about to be quoted, the clock had a gaining rate of about 2½ seconds a-day, or one minute in 23 days. This rate is allowed for in the second column, and being allowed for, the residual error in no case exceeds 22 seconds. Is or is not this result proof that very superior work in the train is not required?

	ERROR.		
	Actual.	Due to gaining rate.	Unaccounted for.
	m. s.	m. s.	m. s.
January 1.....	0 0	0 0	0 0
,, 15.....	0 18	0 25	−0 7
February 1..... ..	0 48	1 5	−0 17
,, 15.....	1 23	1 45	−0 22
March 1...	2 15	2 23	−0 8
,, 15.....	2 45	3 3	−0 18
April 1.....	3 22	3 43	−0 21
,, 15	4 3	4 23	−0 20
May 1.....	5 15	5 3	+0 12
,, 15.....	5 50	5 43	+0 7

The clock was away for cleaning during June, and on its return attempts were made to reduce the gaining rate. This has, apparently, been very successful. (Of course it would be absurd to compare any such clock with an astronomer's clock; we are considering only how much accuracy can be got for £5.)

W. H. DINES'S

ATMOSPHERIC VAPOUR METER.



Scale, 4 inches to the foot.

Here are the values from July 25th to September 14th :—

DATE.	ERROR. m. s.	
July 25	0 33	slow.
August 7.....	0 31	,,
,, 15.....	0 28	,,
,, 20.....	0 22	,,
September 8	0 22	,,
,, 14	0 23	,,

This clock has no gravity escapement, no electrical arrangements, nothing (except the 10/6 additions) beyond what may be found in scores of collier's cottages in Northumberland and Durham.

It, therefore, seems to us, that probably as Mr. Strangway's clock *with* the electrical arrangement costs £8, it would cost only £5 without it, and if so, then we have gained half of our object. We have got for £5 a clock which will keep time within a minute a month.

But our other requirement remains; we want some optician to bring out a cheap and easily-used instrument, for obtaining, either by the sun alone, or preferably by either sun or stars, local time, true to two or three seconds. Who is to have the credit of doing this?]—ED.

ATMOSPHERIC VAPOUR METER.

To the Editor of the Meteorological Magazine.

SIR,—In accordance with your suggestion, I forward herewith diagram and description of the instrument which has been designed for the purpose of obtaining the tension of aqueous vapour directly. The bulbs MM′ are filled with mercury to the level L, and SS′ with sulphuric acid. Air is forced into S until the acid rises to the mark E, and to the zero mark on the gauge GH, which is on the same level. A tap connected with B (not shown in drawing) is then closed. Next, by forcing air in at D, the mercury in M′ is driven into M, on removing the pressure it falls to the level L, drawing the external air into M. The openings at A and C are then closed. The mercury in M′ is again driven into M, the air meanwhile passing down the tube *a*, *b*, and bubbling up through the acid in S′′. The bulb F still contains some acid, through which the air bubbles on its return, the space between the tubes at F being sufficiently large to allow the air to pass up, although not large enough to have allowed much acid to leak through while the air was passing down the tube *a*, *b*. This process is repeated till the air is dry. The acid is then forced up to E, C is opened, and the loss of pressure noted on the gauge GH. The pressure in M being less than before, the mercury in the tube DL falls below L, and consequently the volume of air in M is less. Allowance is made for this error, which is very small, in graduating the gauge GH, which therefore gives the true tension. The bulbs, &c., are fitted into a wooden frame, with a glass front, filled with water above the level of

M. Any change of pressure or temperature which may occur during the observation is shown by some oil in the bent tube ZZ.

The tube YY, which is partly filled with water, serves to check the readings of the guage GH from time to time, one end of it being temporarily connected with A for the purpose. Between B and the tap attached to it, a T piece and flexible tube containing mercury are introduced; by raising or lowering the free end of the tube the acid may be brought to the mark E with great accuracy. An ordinary air syringe is used for forcing air in, or withdrawing it from B and D. A, C and W are closed by screwing an india-rubber washer on to them. It is advisable to introduce a calcium chloride drying tube between D and the syringe, to obviate the possibility of any moisture reaching the mercury in M. It is just possible that the neglect of this precaution may have made some of my readings too low.

Yours truly,

W. H. DINES.

Burgess Hill.

THE INFLUENCE OF THE WEATHER ON THE FARM CROPS.

To the Editor of the Meteorological Magazine.

SIR,—The Government will probably, at no distant day, entertain the suggestion, which has been repeatedly made, of estimating the yield of the crops per acre. It was done in Scotland for a period of years, and but for a small hitch, it would have been continued. It is done annually in Ireland, and the *Mark Lane Express* did it last year, and is again receiving returns from its numerous correspondents in the counties with a view to publication. It is impossible to say what number of bushels of wheat, barley, oats, &c., are grown on an acre in a given locality, but certainly a near approximation can be made by a skilled farmer in the district.

We think that the aid of the meteorologist would be very serviceable in such an undertaking, for the crops are very much what the weather makes them. A cold wet summer is always followed by a deficient harvest and *vice versa*. The reason why the attempts hitherto made to collate the weather and the crops have more or less failed, is, we think, because few have studied their relations with the requisite skill. In fact, it is only now that the farmer is beginning to attach any significance to the records of the meteorologist. Again, the farmer finds that crops do not yield according to appearance, and on that point the thermometric conditions of the earth and air would assist him.

The influence which the weather exerts upon the crops cannot be very easily determined, and it can only be done by taking the temperature and rainfall with minor details for a series of years, and comparing them with the produce of these years on several classes of soils. The months of June, July, and August are mainly to be con-

sidered. There is nothing easier than ascertaining the temperature and rainfall, and their averages; but averages are not enough, there may be a succession of hot days followed by extreme cold. The cold days may do more than neutralize the hot, and who shall value such abnormal conditions? Every person is at present speaking of the promising appearance of the crops, but who can tell how much the extreme cold of the sixteen days of July (13-28) has detracted from their value. We learn that at Braemar the temperature fell to 27° on the morning of the 28th; and at Gordon Castle, the seat of the Duke of Richmond and Gordon, in Banffshire, the mean temperature of these sixteen days was under 53°. This station is about three miles from the sea, and stands at an altitude of 70 feet above the ocean's level. These low temperatures were accompanied by an extra rainfall and northerly or north-westerly winds, and crops made little progress.

Again, at the Cardington Observatory, in the plains of Bedfordshire, a similar condition of the weather is reported, for during these sixteen days the mean temperature was 56°, while the average mean temperature for the month of July, at that station for a long series of years, is 63°. The good weather in the first part of that month and of the concluding days increased the mean temperature, but it was considerably below par. In these cold days some families lighted their room fires on several evenings, and apprehensions are naturally felt as to the influence on the corn crops, which might be expected, when the mean temperature of both June and July was below 60°.

I am, Sir, yours truly,

DAVID ROBIE.

Bedford, 2nd August, 1883.

ON SIMULTANEOUS TEMPERATURES AT DIFFERENT HEIGHTS.

To the Editor of the Meteorological Magazine.

SIR,—In your paper on Temperatures at different heights, you refer to the observations of Six taken at various parts of the tower of Canterbury Cathedral about a century ago, and then pass on to Mr. Main's observations made in 1861. As far as my reading extends, the first continuous set of observations on these comparative temperatures was by M. Pictet, of Geneva, in the year 1779. He noticed that a thermometer suspended 5 ft. from the ground marked a lower temperature on clear nights than one suspended at a height of 75 ft. His object was to ascertain the law of cooling in a vertical column of air. For this purpose he erected a mast in an open plain, with simple arrangements for quickly raising and lowering the thermometers. He also placed a thermometer with its bulb buried in the earth near the foot of the mast, a circumstance which caused him to miss a great discovery; for had he simply placed the bulb on the earth instead of burying it, this acute observer would have

anticipated the true theory of dew; for he would have found that on clear nights the earth's surface is colder than the air above it, whereas he supposed it to be warmer. Passing over a number of interesting results, it may be stated that the readings of the two thermometers at 5 and 75 ft. were alike at about 2 or 2½ hours after sunrise, and continued so during the hottest part of the day; but some time before sunset, the lower thermometer marked a lower temperature than the upper one, the difference increasing rapidly until sunset, and averaging as much as 2° Reaumur, and even more as long as twilight lasted. This difference continued up to 11 o'clock at night, and apparently until sunrise; and not till some time after sunrise did the readings agree, and then they began to cross each other as before. This result was obtained at all seasons, during moderate wind, and in cloudy weather; only in the last case the effect was much less appreciable. When the sky was completely clouded, or fog prevailed, or much wind, the difference disappeared, and the readings of the two thermometers were identical.

Pictet had always supposed the cold of evening to descend from above, and even Sir John Leslie, who died in 1832, always referred the cause of dew to "cold pulses rained from the sky." Pictet says he could scarcely believe his eyes when he found a thermometer at the height of 75 ft. to be more than 2° Reaumur higher than one at 5 ft., and the thermometer hanging at four lines from the ground giving generally a lower reading than one at 5 ft.

The observation with which Wells is generally credited as to the different temperatures on the ground and in the air was, I imagine, first made by Professor Alexander Wilson, of Glasgow, in January, 1768, who noticed that a thermometer placed on the snow marked a temperature 8° F. lower than one suspended in the air. His son, Professor Patrick Wilson, has recorded a multitude of experiments commencing in 1780, in the course of which he constantly found that in clear weather the ground at night is colder than the superincumbent air. He also correctly described the effect of screens, and even made use of the gauze screen associated with the name of Wells. Wilson also attached a thermometer to a hook at the end of a long pole, and raised it to a height of 24 ft.; when, on suddenly lowering the instrument, he was surprised to find a higher reading that at the station below, which marked 10° F.

Mr. Six also, writing in 1783, correctly refers the temperature at the upper station to proceed from a refrigeration which takes place on the surface of the ground in the evening and night, and more particularly so when the weather is still and clear. M. Prevost, of Geneva, in 1792, correctly expounded the doctrine of radiant heat in lowering the temperature of the earth and the action of clouds in limiting radiation.

The whole history of the theory of dew will be found in an essay of mine published in January, 1861, in the *Edinburgh New Philoso-*

phical Journal, and also in a little volume published in Weale's Series in 1863, entitled *Experimental Essays.*

I remain, Sir, sincerely yours,

CHARLES TOMLINSON.

Highgate, N., 17th August, 1883.

[We are glad that an omission, for which we cannot account, has led to the receipt of the above interesting summary. In the *Proceedings of the Royal Society*, the following sentence was inserted because there had not been time to epitomize M. Pictet's experiments. In the reprint in the *Met. Mag.* the words in italics were left out:—"The Author is not aware of any further experiments having been made upon this subject *in this country* until 1861."—ED.]

THE GALE OF SEPTEMBER 1ST.

To the Editor of the Meteorological Magazine.

SIR,—We had a heavy S.S.E. gale in the evening of the 1st inst., veering to S. at 1 a.m., S.S.W. at 6 a.m., and S.W. at 9 a.m. on the 2nd, with a rapid and great fall of the bar. from 29·528 in. (corrected for temp. and height) at 9.14 a.m. on the 1st, to 28·591 in. at 9.14 a.m. on the 2nd, being the lowest observed since December 20th, 1876. The max. velocity of the wind was 45 miles, from 4 to 5 a.m. on the 2nd. The sea and tide were very high in Tor Bay at 6 p.m. on 1st, and 6.30 a.m. on 2nd, and great damage has been done by the rain (0·79 in. on 1st) and wind to the outstanding crops and in orchards.—Believe me, yours sincerely,

Kirkham, Babbacombe, Torquay, Sept. 3rd, 1883. E. E. GLYDE.

SIR,—The gale of September 1st–2nd, 1883, has had the same effect on vegetation as that of April 29th, 1882. The phenomena described in *Met. Mag.* vol. xvii. pp. 65–70, have been reproduced, but the mischief done is *much greater.* I shall esteem it a favour if you will inform me whether meteorologists are yet decided as to the cause of trees, &c., being *scorched* and withered after the gale on the side exposed to the wind. Our maximum wind force here was 10, by estimation.—Yours very truly,

St. Aubin's School, Jersey, Sept. 8th, 1883. J. E. VIBERT.

SIR,—We have had since yesterday morning a heavy south gale, with torrents of rain. Such a severe gale I have not witnessed since the 1st September, 54 years ago. The bar. fell to 28·50, and remained at that low point many hours. It is now, 9.30 a.m., slightly rising. My rain, registered at 9 a.m., was 1·52 in.

The gale began at 10 a.m. yesterday. The London telegram at 10 p.m. on Friday for this district (No. 8) was—"Westerly winds, light to moderate; fair on the whole; some showers." Alas for weather forecasts! Have we yet made one step in advance? I trow not.—Very sincerely yours,

JAMES LIDDELL.

Bodmin, September 2nd, 1883.

LIGHTNING FIGURES.

[We are indebted to Mr. R. Strachan for calling our attention to the following paragraph, the italicised portion of which is remarkably opportune in its bearing on the recent Scottish photograph.—ED].

LIGHTNING ATTACKING AN EDITOR.

LIGHTNING appears to be no respecter of persons, as that American editor who recently had an encounter with a bolt of lightning found out. The gentleman in question, Mr. H. M. Burt, the editor of *Above the Clouds*, published at the Summit House, Mount Washington, New Hampshire, writes to a friend in Hartford, Connecticut, that he was in his office at about six in the evening on July 28th, when he felt a tremendous blow in the back. He states further:—"I could not imagine at first what caused it, but instantly thereafter I saw a ball of fire, as large as a man's head, in front of me, not three feet off. It exploded with a tremendous noise, seemingly as loud as a cannon, and then I knew what must have happened. My left leg seemed to be completely paralysed, and I fell to the floor. Three of my printers were in the room at the time, two sitting at the table near me, and one standing up a little further off. The latter had the skin on one hand torn up, another was hit in the back, and the third escaped without injury. We are glad to be able to record that Mr. Burt gradually recovered from the temporary paralysis induced by the electric stroke. He winds up his account by saying:—"*You have probably heard of the impression of a tree being found upon the bodies of those killed by lightning. The same thing was noticed upon my back, and, as there are no trees upon Mount Washington, it seems to me that the peculiar appearance must be the result of the blood settling in the smaller veins.*" We give the above story with all due reserve. But if it should be true in all its details, and not partly the outcome of the effects of a natural phenomenon on an imaginative brain, the visitation was probably sent as a terrible warning by Jupiter, the God of Thunder—and of "Thunderers," we suppose—to one of the latter tribe to be more sparing in the application of the editorial electric flash in future.—*Iron.*

DESTRUCTIVE LIGHTNING FLASH.

THE *Petersburger Zeitung* reports the destructive action of a flash of lightning which struck the stable attached to the cavalry officers' school at Krasnoje-Selo, killing sixteen horses on the spot. The electric fluid, on striking the corner of the building, seems to have travelled along the iron with which the racks were covered, and set all the hay on fire at once. The horses all fell to the ground. Most of them rose again quickly; but sixteen were found to be dead and two were quite deaf. In all the horses that were killed, the electric fluid seems to have entered at the head or the neck, passing down through the fore feet. The killed horses were not all together, or in adjoining stalls, but were scattered up and down the stable, justifying the presumption that their death was caused by their coming into contact with the metallic covering of the racks. The horses who survived were most probably not in contact with the metal at the moment when it was being traversed by the electric fluid.—"*Public Opinion*," *August 18th, 1883.*

BURSTING OF A WATERSPOUT ON THE OCHILS.

YESTERDAY afternoon, between four and five o'clock, a waterspout of unprecedented magnitude burst on the Ochils between Dollar and Alva. The most serious effects were felt in Alva, where a great deal of property was destroyed. The outflow commenced at Alva burn, and within a quarter of an hour the

principal street was in flood, some parts being fully three feet under water, which carried in its course large quantities of goods from the shops and mills. Passing through Green Square, a complete wreck was made of Mr. Perry's bakery and of the Post Office on the other side of the street. Further down, the factory of Messrs. J. Henderson and Son and Mr. J. Porteous, were nearly wrecked, the workers being knee deep in water. A new workshop belonging to Mr. Chas. Thomson, Burnbrae, was swept away. The middle bridge leading to the glen was also washed away, and here a man had a narrow escape from drowning. The upper bridge was so much shaken that the passage over it was prohibited. Several of the factories will be unable to resume work for weeks. The flood came on so suddenly that people who had crossed the street only three minutes before had almost to swim back to their houses. From a baker's shop five bags of flour and casks of butter were floated a distance of 100 yards. Never will those who witnessed the sudden inundation and its effects forget the scene.

Tillicoultry did not suffer so much, although tons of boulders were washed into the streets from the hills.—"*The Dundee Advertiser*," *August 3rd, 1883.*

AN EXTRAORDINARY METEOR.

THE most remarkable fall of an aërolite that has yet been recorded took place at Lachine, about eight miles from Montreal, on Saturday, July 7th. The following account is from the Montreal *Daily Star* of July 11th :—"The fall of the aërolite transpired during a rain shower on the forenoon of Saturday, and there were no premonitory indications to show that the air was more than usually charged with electricity. The person who witnessed the fall of the aërolite more clearly than anyone else was Mrs. Popham, wife of Mr. Popham, insurance agent. Mrs. Popham was seated upstairs in her house, sewing, when all of a sudden the apartment became illuminated with a blinding flash of light. The lady instantly glanced out of the window, when to her astonishment she beheld a huge mass of fire descending towards the earth in a diagonal direction. This brilliant body had a solid nucleus that appeared to the eye about four feet square, and a strange indescribable noise was caused by its flight through the air. Simultaneously, as it seemed to Mrs. Popham, she received a paralysing shock that affected her from head to foot, as if the entire contents of a highly-charged battery had been discharged into her body at once. The astonishing brilliancy of the meteor caused a temporary loss of sight, and it was fully half an hour before the lady could distinguish surrounding objects.

"When Mrs. Popham first beheld the falling mass she fancied that it was about to strike the house, and is still of the opinion that it must have passed alarmingly close. The lady took several hours to recover from the shock, and when Mr. Popham returned home, several hours after, he found her partially prostrated from its effects. Mr. McNaughton, a brother of Mrs. Popham, was sitting downstairs, reading, when the flash came. He jumped up, and, looking out of the window under the trees towards the river, he plainly saw the fiery ball strike the water at a little distance from the shore, causing a mountainous upheaval and sending splashes in every direction. Mr. Horace Baby also saw the glare caused by the flight of the meteor, although he did not actually see the body itself. He said that he felt a tremendous shock, and that he could feel the electricity oozing out of his finger-ends for some time after. Mr. C. P. Davidson, Q.C., was sitting down to lunch at the time, and describes the crash as being tremendous. The Rawlings family also felt the shock severely, as indeed did half the village. Mr. Popham's cottage stands about seventy feet from the water's edge at Stony Point, and it is thought that the aërolite fell into the stream about twenty or thirty yards from the shore in about twenty feet of water. Owing to the high winds since the occurrence the water has been so muddy that it has been impossible to locate the whereabouts of the meteor. An attempt, however, will shortly be made to bring it to the surface.—"*The Colonies*," *August 10th, 1883.*

ON THE CLIMATE OF THE BRITISH EMPIRE DURING 1882.

THE Climatological Tables which have appeared for nearly two years in this Magazine were, as many of our readers are aware, previously published in *The Colonies*, the series commencing with January, 1874; we have, therefore, similar data for nine years, and although absolute uniformity of instruments and exposure is impossible, and would be unsuitable under such extremely varied conditions as prevail in the different Colonies, our readers may be satisfied that the observations accurately represent the climates of the various stations, and are capable of strict comparison one with another.

The following table gives an epitome of those which have appeared monthly, as well as some data especially computed for it, and leads to the following conclusions :—

The two stations which have the unenviable distinction of dividing between them the greatest number of extremes of the various elements during 1882, are Adelaide and Winnipeg, Manitoba.

Adelaide had the highest shade temp., the highest temp. in sun, the smallest rainfall, and the driest atmosphere.

Winnipeg had the lowest temp. in shade, the greatest range of temp., and the lowest mean daily temp.

Although the max. shade temp. at Adelaide, 112°·0, has more than once been exceeded, the max. in sun, 180°·0, appears to be unusually high, and far exceeds that of any Indian station; the rainfall, 15·74 inches, is also small, though not unprecedentedly so.

The minimum temperature at Winnipeg, —39°·7, is rather high for that station, the average being about —45°, while in 1879 the extreme reading of —50°·5 was registered, which is more suggestive of the records of a voyage of Arctic discovery than of a return from a regularly inhabited district. The great range of temperature at this station must be very trying, its max. during 1882 being 90°·1, nearly ten degrees above that of London and only two or three degrees below those of Bombay and Ceylon, while the total range during the nine years is 145°·5, from 95°·0 to —50°·5, the range at London during the same period being 82°·8 only, not a great deal more than half as much.

Mauritius and Barbados run each other very close for the distinction of the most equable temperature, for while the mean daily range at the former was 8°·5, at the latter it was 8°·8, whereas, if we take the extremes, the case is reversed, Mauritius having a total range of 28°·2, while at Barbados it was only 20°·0.

The greatest rainfall recorded during the year was 79·63 in. at Ceylon, an amount to which no special interest can attach, as it is exceeded not only in many parts of the British Isles, but at numerous places in all the continents of the world; for even in Australia there are records of nearly or quite that amount at one or two stations in Queensland, and of values of 60 inches or thereabouts, on the shores of the Gulf of Carpentaria.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE FOR 1882.

STATIONS.	Absolute.				Average.					Absolute.		Total Rain.		Aver.
	Maximum.		Minimum.		Max.	Min.	Mean.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	Cloud.
	Temp.	Date.	Temp.	Date.										
	°		°		°	°	°	°		°	°	in.		
England, London	80·8	Aug. 6	24·5	Dec. 12	58·3	43·1	50·7	43·7	80	130·0	19·4	27·14	165	6·6
Cape of Good Hope	105·7	Feb. 14	33·8	Sep. 1	74·6	51·8	58·2	54·2	75	...	...	29·29	84	...
Mauritius	86·4	Jan. 21	58·2	June 29	78·5	70·0	74·2	64 6	73	...	...	56·06	209	5·7
Calcutta	101·5	April 26	51·6	Feb. 6, 9	86·7	70·2	78·4	69·7	77	161·7	38·5	66·18	123	4·6
Bombay	94·3	Feb. 25	63·2	Feb. 18	85·5	74·2	79·8	71·5	76	151·1	52·3	69·23	105	3·8
Ceylon	92·5	...	67·6	Dec. 13	86·3	75·5	80·9	71·6	73	157·0	58·0	79·63	159	6·6
Melbourne	110·5	Jan. 19	31·5	June 9	67·8	49·2	58·5	46·3	68	168·9	24·4	22·28	131	5·6
Adelaide	112·0	Jan. 18	34·5	July 17, 28	73·0	53·1	63·1	47·6	58	180·0	27·5	15·74	134	5·0
Wellington	79·0	Nov. 24 & Dec. 24	36·0	Aug. 18	61·2	49·8	55·5	...	...	142·0	30·0	55·69	166	...
Auckland	80·0	Mar. 7	35·6	Aug. 20	65·9	52·8	59·3	51·6	76	...	31·0	45·44	191	6·6
Falkland Isles	69·1	Dec. 16	19·5	June 5	47·7	37·1	42·4	39·0	85	134·2	17·7	30·41	235	7·3
Jamaica	92·2	Aug. 27	61·5	Feb. 6	86·4	71·2	78·8	70·4	78	...	...	20·33	...	4·3
Barbados	86·0	Oct. 21	66·0	Mar. 30	80·9	72·1	76·5	71·6	80	156·0	...	48·01	187	6·0
Toronto	89·9	July 26	−17·4	Jan. 24	53·2	37·5	45·3	38·6	74	145·0	−23·0	24·83	158	6·4
Cape Breton, Sydney	84·5	Aug. 5	−12·8	Mar. 16	48·6	32·5	40·5	36·3	83	...	...	61·20	177	6·5
Manitoba, Winnipeg	90·1	Aug. 27	−39·7	Jan. 23	45·3	23·7	34·5	30·9	80	...	...	24·49	107	4·9

SUMMARY.

Highest temperature in shade, 112°·0 at Adelaide on January 18; Lowest temperature in shade, —39°·7, at Winnipeg, on January 23.
Greatest range in year, 129°·8, at Winnipeg; Least range in year, 20° at Barbados.
Greatest mean daily range, 22°·8, at Cape of Good Hope. Least mean daily range, 8°·5, at Mauritius.
Highest mean daily temperature, 80°·9, at Ceylon. Lowest mean daily temperature, 34°·5, at Winnipeg.
Driest station, Adelaide, 58. Dampest station, Falkland Isles, 85.
Highest temperature in sun, 180°·0, at Adelaide.
Greatest rainfall, 79·63 inches, at Colombo, Ceylon. Least rainfall, 15·74 inches, at Adelaide.
Most cloudy station, Falkland Isles; average amount, 7·3. Least cloudy station, Bombay; average amount, 3·8.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, MARCH, 1883

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Total Rain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0–100	°	°	inches		
England, London	57·0	31	22·4	24	44·9	30·4	31·4	83	101·4	19·3	·86	11	5·4
Cape of Good Hope	...	...	...	...	...	...	...	...	...	...	...	...	...
Mauritius	86·1	14*	68·4	7	83·4	73·5	69·7	76	...	...	4·99	14	6·6
Calcutta	97·4	25	60·3	17	88·9	69·3	66·8	71	153·1	48·3	1·52	6	3·4
Madras	...	...	...	...	...	...	...	...	...	...	...	...	...
Bombay	90·5	31	66·6	12	84·5	71·9	68·0	70	143·7	59·9	·00	0	1·6
Ceylon, Colombo	90·6	12	71·8	14	88·8	74·6	71·3	71	156·0	69·0	5·61	10	4·3
Melbourne	98·0	18	46·0	6	76·1	55·5	53·3	69	161·0	37·0	4·15	11	5·6
Adelaide	101·6	17	46·7	21	81·6	58·2	48·0	46	174·0	39·6	·89	8	4·4
Wellington	77·0	4	45·0	25†	68·7	54·5	...	...	139·0	41·0	5·56	11	...
Auckland	78·5	3	53·0	20	73·5	61·1	58·7	74	131·5	...	2·59	18	6·1
Falkland Isles	60·8	15	29·1	30	50·8	39·2	42·0	87	119·6	24·0	5·34	23	7·7
Jamaica, Kingston	87·6	31	64·6	5	84·2	69·0	69·3	82	...	58·3	2·57	...	3·5
Barbados	83·0	29	73·0	28	79·0	70·0	68·3	76	146·0	66·0	1·36	10	5·0
Toronto	46·1	14	—5·8	22	31·2	11·8	17·5	74	128·5	—14·5	2·36	14	5·6
New Brunswick, S.John	44·0	20‡	—10·0	6	30·4	15·2	23·2	91	...	...	6·18	17	6·3
Cape Breton, Sydney	...	...	...	...	...	...	...	...	...	...	...	...	...
Manitoba, Winnipeg	41·3	13	—28·7	20	18·7	— 9·4	5·5	78	115·0	...	·24	3	4·5
British Columbia, Yale	59·5	15	7·2	2	44·8	22·3	...	...	...	...	·31	4	4·4

* And 18 † And 26. ‡ And 27.

REMARKS, MARCH, 1883.

Mauritius.—Rainfall 2·58 in. and temp. 0°·1 below the average; mean pressure 29·963 in.; mean hourly velocity of wind 9·1 miles, extremes 26·2 miles and 1·8 mile; prevailing direction E.S.E. to E.N.E.; T and L on 6th to 8th, 14th to 20th, and on 21st. C. MELDRUM, F.R.S.

CEYLON.—TSS occurred on 11 days, L was seen on three other days, and T was heard on three other days.

Melbourne.—Mean pressure, mean temp. of air and of dewpoint, mean humidity, rainfall and amount of cloud, all above the average; rainfall very considerably, but pressure, humidity and cloud only slightly; prevailing direction of wind S. to W., strong breezes occurring on six days; heavy dew frequent; dense fog on 15th; T and L on 24th, 25th and 30th. R. L. J. ELLERY, F.R.S.

Adelaide.—Mean pressure 30·090 in. slightly above the average; mean temp. 0°·8 below the average, the max. reaching 90° on seven days; rainfall ·32 in. below average. C. TODD.

Wellington.—Weather generally fine till 10th; strong wind and 2·83 in. of R on 12th; then generally fine again till towards the end of the month; mean pressure slightly above, and mean temp. below the average; rainfall nearly double the average; slight earthquakes on 21st and 28th. R. B. GORE.

Auckland.—Weather at commencement and end of month fair but showery in the middle; bar. high, mean 30·188 in.; strong N.E. gale with heavy R on 11th; average velocity of wind 251·7 miles per diem. E. B. DICKSON.

Falkland Isles.—A wet month, snow on 29th and 31st. F. E. COBB.

BARBADOS.—Mean temp. 73°·9, same as the average of 25 years; prevailing wind N.E., average velocity 11·4 miles per hour, extremes 15·7 miles and 6·8 miles; rainfall below the average; evaporation above it. R. BOWIE WALCOTT.

SUPPLEMENTARY TABLE OF RAINFALL, AUGUST, 1883.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Rain.
		in.			in.
II.	Dorking, Abinger	·82	XI.	Llanfrechfa Grange	1·98
,,	Margate, Birchington...	·49	,,	Llandovery	2·64
,,	Littlehampton	1·32	,,	Solva	1·23
,,	St. Leonards	·67	,,	Castle Malgwyn	1·38
,,	Hailsham	1·16	,,	Rhayader, Nantgwillt..	2·91
,,	I. of W., St. Lawrence.	·73	,,	Carno, Tybrith	3·49
,,	Alton, Ashdell.....	1·14	,,	Corwen, Rhug	1·63
III.	Winslow, Addington ...	·83	,,	Port Madoc	4·28
,,	Oxford, Magdalen Col...	·70	,,	I. of Man, Douglas	3·76
,,	Northampton	1·09	XII.	Carsphairn	...
,,	Cambridge, Beech Ho...	·84	,,	Melrose, Abbey Gate ...	2·53
IV.	Southend	·28	XIII.	N. Esk Res. [Penicuick]	4·15
,,	Harlow, Sheering	1·12	XIV.	Ayr, Cassillis House ...	6·13
,,	Diss	·68	,,	Glasgow, Queen's Park.	4·21
,,	Swaffham	1·08	XV.	Islay, Gruinart School..	5·71
,,	Hindringham	1·65	XVI.	St Andrews, Newton Bk	2·69
V.	Salisbury, Alderbury...	1·03	,,	Aberfeldy H.R.S.	...
,,	Warminster	1·96	,,	Dalnaspidal H.R.S. ...	6·82
,,	Calne, Compton Bassett	1·40	XVII.	Keith H.R.S.	5·61
,,	Beaminster Vicarage ...	1·31	XVIII.	Forres H.R.S.	3·96
,,	Ashburton, Holne Vic..	1·82	,,	Strome Ferry H.R.S....	7·74
,,	Torrington, Langtree W.	...	,,	Lochbroom	6·79
,,	Lynmouth, Glenthorne.	1·71	,,	Tain, Springfield.....	3·56
,,	Probus Lamellyn	1·33	,,	Loch Shiel, Glenaladale	10 49
,,	Taunton, Fullands	1·12	XIX.	Lairg H.R.S.	3·92
VI.	Bristol, Clifton	2·38	,,	Forsinard H.R.S.	3·72
,,	Ross	·81	,,	Watten H.R.S.	2·93
,,	Wem, Sansaw Hall.....	1·51	XX.	Fermoy, Glenville	5·18
,,	Cheadle, The Heath Ho.	2·10	,,	Tralee, Castlemorris ...	4·07
,,	Worcester, Diglis Lock	·91	,,	Tipperary, Henry Street	3·83
,,	Coventry, Coundon	·93	,,	Newcastle West	4·32
VII.	Melton, Coston	2·93	,,	Kilrush	...
,,	Ketton Hall [Stamford]	·91	,,	Corofin	5·06
,,	Horncastle, Bucknall ...	1·59	XXI.	Carlow, Browne's Hill..	4·13
,,	Mansfield, St. John's St.	1·54	,,	Navan, Balrath	2·15
VIII.	Macclesfield, The Park.	2·69	,,	Athlone, Twyford	5·41
,,	Walton-or-the-Hill.....	2·49	XXII.	Mullingar, Belvedere ...	3·37
,,	Lancaster, South Road.	3·12	,,	Clifden, Kylemore	5·23
,,	Broughton-in-Furness ..	...	,,	Crossmolina, Enniscoe..	...
IX.	Wakefield, Stanley Vic.	1·50	,,	Carrick-on-Shannon ...	3·80
,,	Ripon, Mickley	1·21	XXIII.	Dowra	...
,,	Scarborough.....	1·22	,,	Rockcorry.....	3·35
,,	East Layton [Darlington]	1·79	,,	Warrenpoint	4·36
,,	Middleton, Mickleton ..	3·07	,,	Newtownards	5·95
X.	Haltwhistle, Unthank..	4·14	,,	Belfast, New Barnsley..	6·20
,,	Shap, Copy Hill	3·50	,,	Bushmills	5·56
			,,	Buncrana	5·48

AUGUST, 1883.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1870–9	Greatest Fall in 24 hours. Dpth	Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date.	Min. Deg.	Date.	No. of Nights below 32°. In shade.	On grass.
			inches	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	·93	— 1·81	·39	8	10	82·7	21	46·9	20	0	0
II.		Maidstone (Hunton Court)...	·50	— 1·74	·12	8	7	...	...	...	...	...	...
,,		Strathfield Turgiss	·59	— 1·83	·27	31	12	81·0	21	41·8	20	0	0
III.		Hitchin	·80	— 1·48	·20	31	10	74·0	21	44·0	23	0	...
,,		Banbury	·98	— 1·72	·27	31	14	78·0	13	42·0	1	0	...
IV.		Bury St. Edmunds (Culford)	1·47	— ·70	·53	31	12	79·0	13	41·0	16*a*	0	..
,,		Norwich (Cossey)	·70	— 1·92	·21	31	8	83·7	13	41·0	17	0	...
V.		Bridport	·79	...	·26	7	12	...	..	...	...	...	...
,,		Barnstaple.....	2·29	— 1·81	·61	6	16	78·0	25*b*	52·0	3	0	..
,,		Bodmin	1·44	— 3·40	·28	14	21	72·0	21	48·0	12	0	0
VI.		Cirencester	1·00	— 2·66	·34	8	14	..	...	...	...	...	...
,,		ChurchStretton(Woolstaston)	1·56	— 2·52	·53	8	12	72·5	25	46·0	9	0	0
,,		Tenbury (Orleton)	·86	— 2·86	·13	8	13	75·7	13	39·7	23	0	0
VII.		Leicester	1·16	...	·30	8	13	79·3	13	44·0	23	0	0
,,		Boston	1·30	— 1·31	·80	8	10	82·0	13	45·0	17	0	...
,,		Grimsby (Killingholme).....	1·37	— 1·55	·62	8	17	74·0	13	48·0	19*c*	0	...
,,		Hesley Hall [Tickhill].....	1·01	...	·38	8	13	78·0	25	39·0	19	0	...
VIII.		Manchester (Ardwick).....	3·53	— ·39	1·32	9	16	77·0	13	47·0	12	0	...
IX.		Wetherby (Ribston Hall) ..	1·29	— 1·34	·71	9	7	...	...	...	...	...	...
,,		Skipton (Arncliffe)	4·38	— 1·42	·96	14	18	78·0	22	43·0	2	0	...
X.		North Shields	2·64	— ·45	·65	15	12	73·5	14	42·5	12	0	0
,,		Borrowdale (Seathwaite).....	11·33	+ ·29	1·49	7, 9	21	71·2	24	42·9	12	0	...
XI.	WALES.	Cardiff (Ely).....	2·68	— 2·65	·83	14	15	...	...	...	...	...	...
,,		Haverfordwest	2·34	— 2·63	·90	8	18	72·0	24	27·5	23	1	1
,,		Plinlimmon (Cwmsymlog) ...	5·36	...	1·10	8	20	...	...	...	...	...	...
,,		Llandudno.....	1·82	— 1·37	·37	14	13	69·0	25*d*	48·8	24	0	0
XII.	SCOTLAND.	Cargen [Dumfries]	4·53	+ ·26	1·29	12	18	70·2	2	41·8	12	0	...
,,		Hawick	3·22	— ·68	·91	12	12	...	...	..	...	...	...
XIV.		Douglas Castle (Newmains)	5·34	+ 1·04	1·28	12	12	...	...	...	...	...	...
XV.		Lochgilphead (Kilmory).....	6·54	+ 1·32	1·39	9	21	...	...	...	...	...	...
,,		Appin (Airds)	6·91	...	...	...	...	...	...	...	...	...	...
,,		Mull (Quinish).....	6·17	...	·92	7	27	...	...	...	...	...	.
XVI.		Loch Leven Sluices	4·30	+ ·22	...	...	...	...	...	...	...	...	...
,,		Arbroath	2·94	— ·39	·58	12	13	70·0	24	45·0	12*e*	0	...
XVII.		Braemar	5·18	+ ·75	·71	9	20	69·0	25	40·3	8	0	2
,,		Aberdeen	3·77	...	·91	13	14	71·0	25	43·0	17	0	0
XVIII		Skye (Sligachan)	10·35	...	1·65	8	24	...	...	...	...	...	...
,,		Culloden	2·96	— ·04	·45	1	10	69·0	25	44·0	23	0	0
XIX.		Dunrobin	4·24	...	·64	13	17	69·2	25	43·0	19	0	...
,,		Orkney (Sandwick).....	3·15	+ ·25	·70	11	21	63·8	25	41·6	13	0	0
XX.	IRELAND.	Cork (Blackrock)	4·63	+ ·80	1·61	12	12	84·0	25	41·0	17	0	0
,,		Dromore Castle	8·44	...	2·78	12	25	70·0	24*f*	43·0	7	0	...
,,		Waterford (Brook Lodge) ...	4·25	...	2·32	12	16	71·0	8*i*	42·5	16*j*	0	...
,,		Killaloe	6·54	...	2·27	12	17	78·0	26*g*	43·0	14	0	...
XXI.		Portarlington	3·51	+ ·44	·91	12	17	73·0	23	46·0	11	0	...
,,		Dublin (FitzWilliam Square)	3·31	+ ·13	1·04	6	14	71·4	26	48·0	12	0	0
XXII.		Ballinasloe	4·48	+ ·45	1·38	12	19	65·0	27	42·0	12	0	...
XXIII.		Waringstown	3·03	— ·41	1·41	12	15	78·0	24	43·0	11*h*	0	0
,,		Londonderry (Creggan Res.).	5·33	...	1·29	12	22	...	...	...	...	...	...
,,		Omagh (Edenfel)	5·07	+ 1·42	2·23	12	19	70·0	25	42·0	15	0	...

+ Shows that the fall was above the average ; — that it was below it.

a And 23. *b* And 26. *c* And 24 *d* And 26. *e* And 31. *f* And 25. *g* And 27. *h* And 31. *i* And 22, 23. *j* And 25.

METEOROLOGICAL NOTES ON AUGUST.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain H for Hail S for Snow.

ENGLAND.

STRATHFIELD TURGISS.—A seasonable, fine month, with remarkably good harvest weather; all crops are excellent.

BANBURY.—The last three weeks of the month were very favourable for harvest operations, and much corn was secured in good condition; mean. temp. of the month 60°·1; high wind on 13th, 1t4h, and 15th.

CULFORD.—The weather was most propitious for the ingathering of the harvest, which was nearly concluded at the end of the month; refreshing rains occurred at intervals.

COSSEY.—A fine harvest month; fog on 19th, 23rd, 24th and 25th.

BODMIN.—Mean temperature of the month 60°·9; 1°·1 below the average.

CIRENCESTER.—This is the first August for several years with a rainfall below the average.

WOOLSTASTON.—A favourable month for harvest operations, the grain crops maturing with great rapidity in the third week, and being secured in good condition in many districts by the end of the month. Mean temperature of the month 59°·1.

ORLETON.—A variable sky with a low temp., much cloud, and frequent falls of R prevailed till the 12th; the remainder of the month was very fine and dry with much sunshine, and a higher temperature; in every way favourable for ripening the grain crops. The max. temp. was above 70° on 18 days, but only reached 75°·7, and the mean temp. of the month was about a ¼ of a degree below the average of 22 years. Very distant T was heard on the 9th, but no L was seen during the month.

LEICESTER.—The first half of the month was rather unsettled, although no heavy R fell; the second half was very dry and fine, no R falling between the 15th and 27th. Much corn cut and some carried.

KILLINGHOLME.—A very fine harvest month; a good deal of corn carried in the last week; potatoes sounder than for several years; apples a good crop. T and L, with high wind on 8th; T on 14th.

MANCHESTER.—The beginning of the month was promising, but the weather broke about the 7th, and became rough and stormy, heavy rains damaging the crops; it then became more settled as the month advanced, and the temp. rose, which benefited the crops greatly. The temp. of the month, however, was below the average. Heavy TS on 8th; T on 30th.

NORTH SHIELDS.—TSS on 2nd and 10th; T on 14th and 15th.

SEATHWAITE.—Stormy with heavy R from 7th to 9th; 4·27 in. of R falling during the three days; 3·89 in. also fell during the three days 12th to 14th.

WALES.

HAVERFORDWEST.—The summer as a whole was not favourable: there were very few hot days, and a great absence of sunlight, and it was at times stormy and frequently close and relaxing. There were a few fine sunshiny days during the last fortnight of August, but although the rainfall of the month was below the average, the number of days on which R fell rendered it very hindering to the harvest. Rivers and brooks unusually low.

LLANDUDNO.—Though the mean temp. was nearly 3° below the average, August was on the whole a fine month, and most seasonable for the cereals and green crops; there was a fair amount of sunshine (152·3 hours), and the temp. was very steady, the mean daily range being only 10°·7, and the total range during the month 20°·2. Began to cut oats on 14th, and wheat and barley on 16th.

SCOTLAND.

CARGEN.—Mean temp. of the month 2°·3 below the average; duration of sunshine also much below the average; very stormy and wet from 12th to 15th; T on 10th.

HAWICK.—A fine genial month; harvest operations commenced towards the close; very severe TS on 10th.

QUINISH.—A very wet gloomy month, with remarkable absence of sunshine; nearly all the hay which was not secured in July rotted on the ground; corn crops are badly laid, but potatoes are free from disease.

ABERDEEN.—Fairly good weather throughout the month, rainfall slightly above the average; squally and wet from 7th to 10th; L on 30th; T, L, R and H on 31st.

CULLODEN.—Temp. of the month low, but the weather as a whole was fair; no R fell between the 14th and 25th.

SANDWICK.—August was colder, wetter and more cloudy than the average, so the ripening of the crops was retarded and harvest was not begun at the close of the month.

IRELAND.

CORK.—The early part of the month was abnormally wet, but after the 14th no R fell, and fine harvest weather prevailed for a fortnight; no TS.

DROMORE.—The month gave an epitome of all weather, fog, mist, rain, storm, sunshine, and high temp. all occurring. On the 8th occurred the heaviest rainfall for several years (1·68 in.), but the 12th exceeded anything on record, 2·78 in. falling in less than 12 hours during a calm with high temp. Hay crop plentiful but injured; oats a heavy crop but much laid; potatoes better than for the last 30 years, which, occurring after a wet summer with high temp., is against the theory of meteorological causes of the disease.

KILLALOE.—Considerable loss of hay on low-lying lands, and injury to bridges resulted from the unusually heavy R of the 12th. The splendid weather of the latter part of the month effected a marked improvement in the appearance of all crops; harvest very late, reaping only commenced on 30th.

DUBLIN.—The first half of the month was unsettled, with heavy rains and high winds; after the 14th there was a decided improvement, and the second half of the month was dry, comparatively bright and warm. The mean temp. (58°·6) was as nearly as possible equal to the average of 18 years. Violent TSS occurred in the evening and continued late into the night on the 6th, the L being very vivid, and accompanied by torrents of R (1·04 in. fell in less than two hours). With this exception, no electrical disturbance was recorded at Dublin, but on the 9th L was seen over the sea.

WARINGSTOWN.—A very fine month; crops of all descriptions most promising.

EDENFEL.—With the exception of the second week the weather of the month was fine and favourable, although without much heat or sunshine. Between 2 p.m. on 12th and 9 a.m. on 13th there occurred the heaviest rainfall for at least 20 years, viz, 2·23 in. followed in the next 48 hours by 1·37 inches. Crops heavy, but harvest not commenced at the close of the month.

ONTARIO.—On the night of August 22 a hurricane swept through the Ottawa Valley, doing great damage to barns, fences, and crops in the country districts. Two barns were fired by the lightning, many trees blown down, and the telegraph poles laid flat in most parts of the course of the storm. One man received bad injuries.